

# **PROJECT MANAGEMENT**

***16ME653 -PE***

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# **BOOKS**

- 1. S Choudhary, “Project Management”** Tata McGraw Hill  
Education Private Limited New Delhi.  
2001
- 2. Harold Kerzner, “Project Management: A Systems  
Approach To Planning, Scheduling And Controlling ”,** CBS publisher and  
distributers
- 3. L S Srinath “ PERT and CPM Principles and  
Applications”** Third Eddition
- 4. Dr. P N Modi “PERT and CPM”**



## UNIT -2: PROJECT PLANNING AND ESTIMATING

- Feasibility report
- Phased planning
- Project planning steps
- Objectives and goals of project
- Preparation of cost estimation
- Evaluation of project profitability

**Self learning:** Project Management Bottle necks



## PROJECT CAN BE FULLY ESTABLISHED WHEN FOLLOWING CONDITIONS ARE FULFILLED.

1. The technical configuration of the project has been fully defined
2. The performance requirement for various technical systems, sub-systems and the key equipments have been specified
3. Cost estimation for project is frozen
4. Techno-economic viability of project has been examined and approved.
5. An overall schedule for implementation of the project has been drawn up



6. Financial arrangements have been made to implement the project

7. A project management has been approved for implementation of the project.

8. Pre project activities have been complited and zero date is fixed



# FEASIBILITY REPORT

According to guidelines published by Planning Commission feasibility report should include –

1. Raw material
2. Demand study
3. Technical study
  - Product pattern
  - Process selection
  - Plant size
  - Raw material requirements
4. Location study
5. Project capital cost estimation and source of finance
6. Profitability and cash flow analysis
7. Cost benefit analysis



# RAW MATERIAL SURVEY

The raw material may belong to any of the following categories .

- 1.Available as deposit in natural form
2. Available as finished product or by-product
3. Not available in country but to be imported



# DEMAND STUDY

A demand study normally would establish the following.

1. Demand
2. Supply
3. Distribution
4. Prices

Most of the information is available from published literature. The documents that are usually referred are -

- Plan documents
- Guidelines to industries
- Economic survey
- Annual survey of industries.
- Import and export statistics.
- Monthly bulletin of reserve bank of India.
- Survey reports of various institutions.





# TECHNICAL STUDY

- Product Pattern
- Process Selection
- Plant size
- Raw material requirements



# LOCATION STUDY

- Availability of land, soil characteristics and cost of land
- Approach to site
- Source of raw material and transportation requirements
- Transportation and marketing of finished products
- Source and availability of water
- Availability of power and source
- Availability of skilled manpower
- Social amenities in the area
- Availability of Tax incentives if any
- Facility for drainage and effluent disposal
- Availability of engineering and maintenance facilities
- Acceptance of project by local bodies



# PREPARATION OF COST ESTIMATION

A project cost estimate is required not only for assessing fund requirement but also for ascertaining the economic variability.

## Types of Estimates

1. Order of magnitude estimate
2. Study estimate
3. Preliminary estimate
4. Definitive estimate
5. Detailed estimate



# 1. ORDER OF MAGNITUDE

## 1) Order of magnitude Estimate

a) Investment for annual tonne capacity.  
If installed cost of plant  $P_1$  of annual capacity  $C_1$  tonne is rupees  $R_1$

then installed cost  $R_2$  of plant  $P_2$  having annual capacity of  $C_2$  can be estimated as

$$R_2 = \frac{R_1 \times C_2}{C_1}$$

(Installed cost)

This method assumes that cost of plant per annual tonne capacity for particular type of industry will hold true for all capacities if the technology remains same.

## b) Turn-over ratio & Capital ratio

• the ratio between annual sales & investment expressed in  $R_1$  is Turn-over ratio.

• the ratio between plant investment & annual sales expressed in  $R_2$  is - Capital ratio.

Installed cost  $R_2$  can be estimated.

$$R_2 = C \times V_1 \times P_1$$

$V_1$  - ~~proposed~~ projected annual sales volume

$P_1$  - price per unit of sales volume

$C$  - plant size for particular process

c) Six-tenth factor:

Plant investment is assumed to vary as 0.6 power of plant size.

$$\text{estimated cost } R_2 = R_1 \times \left( \frac{C_2}{C_1} \right)^{0.6}$$

$R_1$  &  $C_1$  represents cost & capacity of previous completed plant  
 $C_2$  - capacity of proposed plant.

d) Inflation index

$$\text{Installed cost (now)} = \frac{\text{Installed cost (past)}}{\text{Cost index (past)}} \times \frac{\text{Cost index (now)}}{\text{Cost index (past)}}$$

Consumer price index is available in Reserve bank of India. bulletin

e) Location index

The cost of similarly plant in India or any other country can be estimated using Index.

## 2. STUDY ESTIMATE

- This estimate is for studying the economic variability of project and arranging funds for project
- Preliminary flow sheet , listing of major process equipment, material of construction.
- The overall plant cost estimated by multiplying total equipment cost by factor known as lang factor.
- This factor takes care of civil electrical, piping, instrumentation and installation cost.
- The accuracy of estimate at this stage is 30%



### 3. PRELIMINARY ESTIMATE

- Preliminary estimate is prepared when the technology package is frozen. And firms implementation schedule is available.
- This point of time is considered as **Effective Strat Date or Zero Date of Project.**
- At this stage budgeting allocation is frozen



## 4. DEFINITIVE ESTIMATE

- The estimate is prepared after Zero date
- Equipment specifications/quotations/awarded cost
- General arrangement drawings
- Schedule of items for works tenders/ contractors quotes.





## 5. DETAILED ESTIMATE

This estimate is made on completion of engineering, ordering of equipment's, machinery and field contractors

- Order value of plant equipment.
- Awarded cost of major contractors.
- Final material take-offs
- Construction drawings



TABLE 2.3 A typical definitive cost estimate

S. No.	Expense head	Rs. lakhs	Sub-total Rs lakhs
1.0	Land and site development		46.31
1.1	Cost of land	15.00	
1.2	Site grading	15.71	
1.3	Roads and drains	2.00	
1.4	Compound wall	13.60	
2.0	Water supply to plants		109.84
2.1	Water supply from river to battery limit and treatment plant	100.48	
2.2	Overhead tank	9.36	
3.0	Power supply to plants		47.10
3.1	Power supply from SEB	10.60	
3.2	Switch yard	29.50	
3.3	Sub-station building	4.00	
3.4	Street lighting	3.00	
4.0	Non-plant buildings		73.29
4.1	Administration building	3.60	
4.2	Central laboratory	11.40	
4.3	Canteen	7.00	
4.4	Dispensary	3.60	
4.5	Rest room	3.00	
4.6	Central stores	6.25	
4.7	Workshop	4.52	
4.8	Shed for DG sets	2.00	
4.9	Raw material stores	13.60	
4.10	Finished product store	12.00	
4.11	Gate house and time office	1.20	
4.12	Civil maintenance office	3.20	
4.13	Cycle shed	0.52	
4.14	Scale room	1.40	
5.0	Office-site facilities		13.39
5.1	Fork lift truck	2.28	
5.2	Canteen facilities	1.30	
5.3	Dispensary equipment	1.00	
5.4	Time clocking system	0.50	
5.5	Weigh bridge	4.36	
5.6	Telephone and intercom	3.95	
6.0	Utility piping		7.38
6.1	Steam piping	4.88	
6.2	Water piping	2.50	
7.0	Township		98.92
7.1	Cost of land	5.00	
7.2	Site grading, roads, drainage, sewerage, etc.	13.40	
7.3	Power supply and distribution	15.00	
7.4	Water supply	11.52	
7.5	Fencing	1.00	
7.6	Quarters	53.00	
8.0	Plant and machinery		833.75
8.1	Main plant machinery including spares	769.44	

(Contd.)

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S. No.	Expense head	Rs lakhs	Sub-total Rs lakhs
8.2	Laboratory equipment	44.82	
8.3	Workshop equipment	3.99	
8.4	Start-up and commissioning	15.50	
9.0	Plant utilities		154.11
9.1	Sub-station equipment	56.20	
9.2	Power distribution system	29.60	
9.3	Boiler	19.50	
9.4	Generators	13.30	
9.5	Air compressors	7.99	
9.6	Dust proofing system	2.70	
9.7	Coal storage	0.50	
9.8	Utility piping within the building	24.32	
10.0	Plant buildings		100.34
10.1	Main process buildings	78.34	
10.2	Foundation and pavements	22.00	
11.0	Miscellaneous fixed assets		29.01
11.1	Office furniture	13.00	
11.2	Air conditioners	4.50	
11.3	Public address system	5.00	
11.4	Fire fighting equipment	0.62	
11.5	Cranes and hoists	2.29	
11.6	Miscellaneous tools and tackles	3.60	
12.0	Technical fee		128.29
12.1	Know-how fee	68.29	
12.2	Consultants' fee	60.00	
13.0	Training expenses		18.50
14.0	Owner's expenses		81.72
14.1	Temporary power supply	3.00	
14.2	Travelling expenses	12.50	
14.3	Soil investigation	2.20	
14.4	Incidental expenses during construction period	6.00	
14.5	Interest on loan during construction	48.19	
14.6	Insurance during construction	9.83	
15.0	Margin money for working capital		38.57
16.0	Contingencies		66.06
	Total capital cost estimate		1846.58

Our concern at this stage is to establish a cost target for the project. The purpose of discussing various methods was only to ensure that what we set as the target is realistic, achievable and worth striving for. It will be an exercise in self-deceit to expect the completion of a project at a budget which is not at all realistic.

### FINALISATION OF PROJECT IMPLEMENTATION SCHEDULE

Almost the same considerations hold good for project time schedule. At the zero date of the project, we have to set a time target for its completion. This has again got to be realistic because nothing can be achieved by day-dreaming alone.

# VARIOUS TYPES OF ESTIMATES

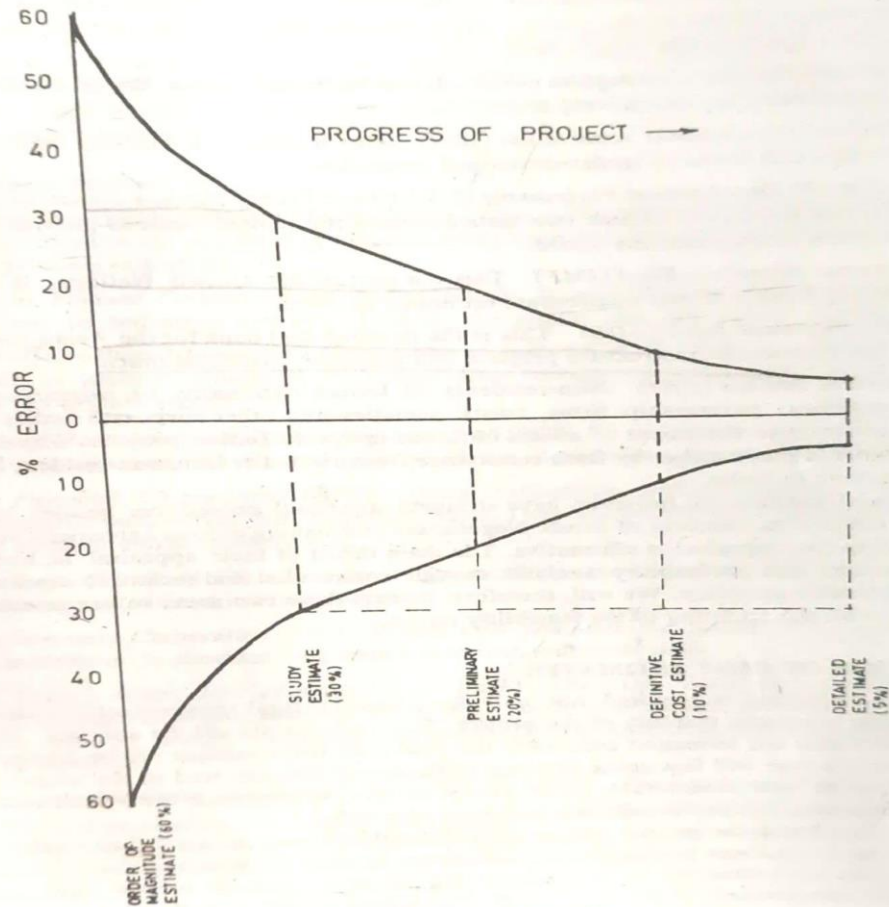



FIG. 2.1 Various types of estimates

# FINANCIAL INSTITUTIONS

## **National Financial Institutions**

- IDBI
- IFCI
- ICICI
- IRCI
- SFC
- UTI
- LIC
- The Export and Import bank
- SIDC

## **Foreign Financial Institutions**

- World bank (International bank for reconstruction and development)
  - IFC
  - IDA
  - IMF
  - ADB
- 

# EVALUATION OF PROJECT PROFITABILITY

1. Pay Back Period ( PBB)
2. Return on investment (ROI)
3. Net Present Value (NPV)
4. Internal Rate of Return.(IRR)
5. Benefit Cost Ratio.(BCR)



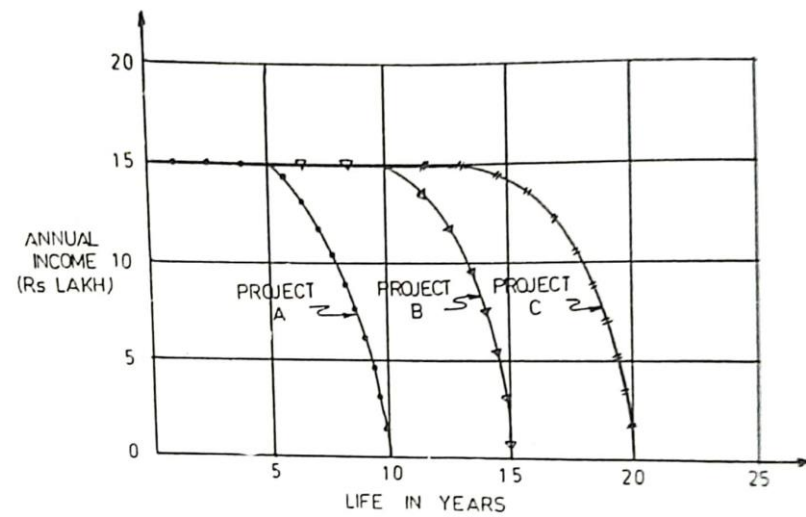
# PAY BACK PERIOD (PBB)

pay Back period

$$\begin{aligned} \text{PBB} &= \frac{\text{Original Investment (Rs)}}{\text{Annual Income (Rs)}} \\ &= \text{Number of years.} \end{aligned}$$



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	PROJECT A	PROJECT B	PROJECT C
CAPITAL INVESTMENT (RS LAKH)	150	150	150
PROJECT OPERATING LIFE (YEARS)	10	15	20
ANNUAL INCOME (RS LAKH)	15	15	15
	(1st 5 YEARS)	(1st 10 YEARS)	(1st 15 YEARS)
PAY BACK PERIOD (YEARS)	10	10	10

FIG. 2.6 Pay-back period calculation



# RETURN ON INVESTMENT (ROI)

Return on Investment (ROI)

$$ROI = \frac{\text{Average annual earnings after tax}}{\text{Average book investment after depreciation}}$$

Capital investment = ₹150 lakh.

Project operation life = 10 years

Salvage value at the end of 10 years = 0

expected profit after tax = ₹15 lakhs for 1<sup>st</sup> 5 years  
7.5 lakhs for balance

$$ROI = \frac{(15 \times 5 + 7.5 \times 5) / 10}{(150 + 0) / 2}$$

$$= 15\%$$



# NET PRESENT VALUE (NPV)

Establishing the Project: Scope, Time, Cost and Performance Goals 69

The present value of a future cash flow can, thus, be computed as:

$$PV = S \times \frac{1}{(1+r)^t}$$

where,  $PV$  = present value

$S$  = cash flow at  $t$  year

$r$  = interest rate, also known as discount rate

The factor  $\frac{1}{(1+r)^t}$  is known as discount factor.

Net present value (NPV) for any project is the aggregate present value of net cash flows over the operating life of the project. This can be expressed as

$$NPV = \sum_{t=0}^n St \frac{1}{(1+r)^t} = \sum_{t=1}^n \frac{St}{(1+r)^t} - I$$

where,  $NPV$  = net present value

$St$  = net cash flow for the year  $t$

$t$  = operating year

$n$  = operating life of the project

$I$  = original capital investment

$r$  = interest rate



# BENEFIT COST RATIO.(BCR)

## Benefit Cost Ratio (BCR)

This method is a modified form of the NPV method. The benefit cost ratio is computed as the ratio of aggregate present values of all future cash flows to initial capital investment

$$BCR = \frac{\sum_{t=1}^n \frac{St}{(1+r)^t}}{I}$$

FIG. 4.7 Comparison

where,  $St$  = net cash flow for the year  $t$   
 $n$  = operating life of the project  
 $t$  = operating year  
 $I$  = original capital investment

In this method, higher the benefit cost ratio the better is the project. Projects to be accepted must have benefit cost ratio higher than 1.

## Social Profitability

The methods described so far have examined the financial yields from the projects. While the financial yield is important for most industrial projects, there are other socio-economic

# PROJECT PLANNING

## ➤ **Functions of Project Planning**

## ➤ **Phases of project Planning**

### **a) Pre investment phase**

### **b) Implementation phase**

- Project engineering and design
- Negotiation and contracting
- Construction
- Training
- Plant commissioning

### **a) Operation phase**



# 5 STEPS OF PROJECT MANAGEMENT

norms of productivity.

## 5 Steps of Project Management :

1. Group work into packages that acquires the properties of the project. The group works are related to each other but contribute to the same goal.
2. Entrust the whole project to a single responsibility that is the project manager for co-ordinating, directing and controlling the whole project.
3. Support the project internally by having a matrix type of organisation and support it externally through vendors and contractors.
4. Build up commitment by directing towards the goals through schedules and costs.
5. Ensure adherence to goals by constant monitoring.

